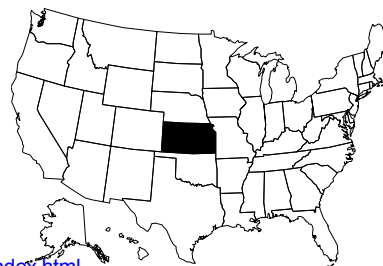


KANSAS

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Program Description

Kansas has maintained a stream biological monitoring program since 1972. Since 1980, the program has remained primarily unchanged. Program data are evaluated and incorporated in five year increments into the 305(b) report and 303(d) list. Data is used to determine aquatic life use support status in combination with chemical water quality data. Further details may be found in the program Quality Management Plan (see documentation below).

Contemporary Program Objectives

The stream biological monitoring program endeavors to provide scientifically defensible information on the quality of flowing waters in Kansas through the analysis of aquatic macroinvertebrate communities. This information is intended for use in:

- (1) complying with the water quality monitoring and reporting requirements of 40 CFR 130.4 and sections 106(e)(1), 303(d) and 305(b) of the federal Clean Water Act;
- (2) evaluating waterbody compliance with the Kansas surface water quality standards (K.A.R. 28-16-28b *et seq.*);
- (3) identifying point and nonpoint sources of pollution contributing most significantly to water use impairments in streams;
- (4) documenting spatial and temporal trends in surface water quality resulting from changes in land use patterns, resource management practices, pollutant loadings, and climatological conditions;
- (5) developing scientifically defensible environmental standards, wastewater treatment plan permits, and waterbody/watershed pollution control plans; and
- (6) evaluating the efficacy of pollution control efforts and waterbody remediation/restoration initiatives implemented by the department and other agencies and organizations.

The Kansas Department of Health and Environment's (KDHE) Bureau of Environmental Field Services is responsible for macroinvertebrate data collection and analysis. The Bureau also analyzes fish community data that are collected by the Kansas Department of Wildlife and Parks (KDWP). KDHE is currently working with the Central Plains Center for BioAssessment (CPCB) at the University of Kansas, to develop both a systematic approach to the identification of reference sites and a regionally standardized approach to habitat assessment.

Documentation and Further Information

Division of Environment Quality Management Plan Part III: Stream Biological Monitoring Program Quality Assurance Management Plan, December 2000: http://www.kdhe.state.ks.us/environment/qmp_2000/download/SBMP_QAMP.pdf

2002 Kansas Water Quality Assessment (305(b) report), April 2002: http://www.kdhe.state.ks.us/befs/305b_2002/ks305b2002f.pdf

Guidance Document for Use Attainability Analyses, December 2001: <http://www.kdhe.state.ks.us/befs/uaas/UAAGuidance.pdf>

Draft 2002 303(d) Methodology and List: <http://www.kdhe.state.ks.us/tmdl/303d.htm>

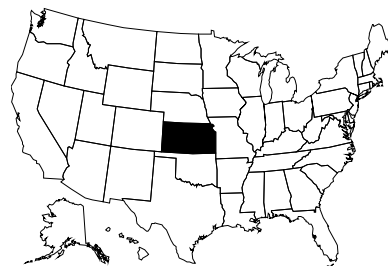
Kansas State Water Quality Standards: <http://www.kdhe.state.ks.us/water/index.html>

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Programmatic Elements

Uses of bioassessment within overall water quality program	<input checked="" type="checkbox"/>	problem identification (screening)
	<input checked="" type="checkbox"/>	nonpoint source assessments
	<input checked="" type="checkbox"/>	monitoring the effectiveness of BMPs
	<input checked="" type="checkbox"/>	ALU determinations/ambient monitoring
	<input checked="" type="checkbox"/>	promulgated into state water quality standards as biocriteria
	<input type="checkbox"/>	support of antidegradation
	<input checked="" type="checkbox"/>	evaluation of discharge permit conditions
	<input checked="" type="checkbox"/>	TMDL assessment and monitoring
	<input checked="" type="checkbox"/>	other: trend analysis
Applicable monitoring designs*	<input checked="" type="checkbox"/>	targeted (i.e., sites selected for specific purpose) (<i>comprehensive use throughout jurisdiction</i>)
	<input checked="" type="checkbox"/>	fixed station (i.e., water quality monitoring stations) (<i>comprehensive use throughout jurisdiction</i>)
	<input type="checkbox"/>	probabilistic by stream order/catchment area
	<input checked="" type="checkbox"/>	probabilistic by ecoregion, or statewide (<i>comprehensive use throughout jurisdiction</i>)
	<input checked="" type="checkbox"/>	rotating basin (<i>comprehensive use throughout jurisdiction</i>)
	<input checked="" type="checkbox"/>	other: rotational sites, statewide (<i>comprehensive use throughout jurisdiction</i>)

*KDWP uses a combination of probabilistic design, rotating basin, and fixed sites; KDHE relies primarily on a targeted design, including fixed and rotational sites statewide.

Stream Miles

Total miles	134,338
<i>(determined using RF3)</i>	
Total perennial miles	23,731
Total miles assessed for biology*	23,731
fully supporting for 305(b)	n/a
partially/non-supporting for 305(b)	n/a
listed for 303(d)	n/a
number of sites sampled	178 targeted over 22 years (KDHE); several hundred probabalistic (KDWP)
number of miles assessed per site	site specific

*Because KDWP uses a probabilistic sampling design, it can be said that all 23,731 perennial stream miles in Kansas are being assessed for biology. KDHE is working with KDWP to incorporate the latter agency's findings into Kansas' 305(b) reports and 303(d) lists. Kansas' 2002 305(b) report is based on four years of ambient stream chemistry data (1998-2001) and only acute aquatic life use support application.

Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Class System (A,B,C)
ALU designations in state water quality standards	Three designations: special aquatic life use, expected aquatic life use, restricted aquatic life use
Narrative Biocriteria in WQS	Procedures used to support narrative biocriteria are located in the most recent 305(b) reports
Numeric Biocriteria in WQS	none (Numeric biocriteria have not been adopted into the state standards, but are nevertheless used for diagnostic purposes and in 305(b) assessments.)
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	<input checked="" type="checkbox"/> assessment of aquatic resources <input checked="" type="checkbox"/> cause and effect determinations <input checked="" type="checkbox"/> permitted discharges <input checked="" type="checkbox"/> monitoring (e.g., improvements after mitigation) <input type="checkbox"/> watershed based management
Uses of bioassessment/biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	Various point source upgrades and TMDL-related applications

Reference Site/Condition Development

Number of reference sites	44 total
Reference site determinations*	<input type="checkbox"/> site-specific <input type="checkbox"/> paired watersheds <input type="checkbox"/> regional (aggregate of sites) <input checked="" type="checkbox"/> professional judgment <input type="checkbox"/> other:
Reference site criteria	<p>To date, sites have been selected on the basis of land cover and land use, known hydrological properties and channel characteristics, general absence of confined animal feeding operations, point sources and urban areas, and favorable water quality attributes (low levels of total suspended solids, biochemical oxygen demand, fecal coliform bacteria, total phosphorus, inorganic nitrogen, herbicides, and other contaminants). Rare taxa and historically occurring key species are mainly used for validation purposes.</p> <p>Reference sites, by definition, should also be minimally impacted by anthropogenic phenomena and approach the presettlement condition in terms of hydrology, water quality, available biological habitat, surrounding landscape and watershed attributes, and historically documented plant and animal communities.</p>
Characterization of reference sites within a regional context	<input checked="" type="checkbox"/> historical conditions <input checked="" type="checkbox"/> least disturbed sites <input type="checkbox"/> gradient response <input type="checkbox"/> professional judgment <input type="checkbox"/> other:
Stream stratification within regional reference conditions	<input checked="" type="checkbox"/> ecoregions (or some aggregate) <input type="checkbox"/> elevation <input type="checkbox"/> stream type <input type="checkbox"/> multivariate grouping <input type="checkbox"/> jurisdictional (i.e., statewide) <input checked="" type="checkbox"/> other: stream size
Additional information	<input type="checkbox"/> reference sites linked to ALU <input type="checkbox"/> reference sites/condition referenced in water quality standards <input checked="" type="checkbox"/> some reference sites represent acceptable human-induced conditions

*Currently working with the Central Plains Center for BioAssessment (CPCB) at the University of Kansas to develop a more systematic approach to the identification of reference sites.

Field and Lab Methods

Assemblages assessed	<input checked="" type="checkbox"/>	benthos (<i>100 - 500 samples/year; single season, multiple sites - broad coverage; multiple seasons, select sites</i>)
	<input checked="" type="checkbox"/>	fish (<i><100 samples/year; single season, multiple sites - broad coverage by KDWP only</i>)
	<input checked="" type="checkbox"/>	periphyton (<i>100 - 500 samples/year; multiple seasons, multiple sites - broad coverage for watershed level</i>)*
	<input checked="" type="checkbox"/>	other: phytoplankton
Benthos		
sampling gear		collect by hand, D-frame; 500 - 600 micron mesh
habitat selection		richest habitat, riffle/run, multihabitat, woody debris, random sampling by KDWP only
subsample size		entire sample, 100 count minimum
taxonomy		genus/species where practical
Fish		
sampling gear		seine, backpack electrofisher, pram unit (tote barge); 1/8" and 3/16" mesh
habitat selection		multihabitat
sample processing		length measurement, biomass – batch
subsample		batch (generally do not subsample)
taxonomy		species
Periphyton*		
sampling gear		natural substrate: suction device, bar clamp sample; artificial substrate: periphytometer
habitat selection		wadeable area within stream segment that is designated based on other sampled biota
sample processing		chlorophyll <i>a</i> /phaeophytin, taxonomic identification (limited use)
taxonomy		diatoms only
Habitat assessments		
		visual based (KDHE), quantitative measurements (KDWP); performed with bioassessments
Quality assurance program elements		
		standard operating procedures, quality assurance plan, periodic meetings/training for biologists, sorting and taxonomic proficiency checks, specimen archival, replicate sampling, field audits, and staff certification program

*Periphyton sampling is a new venture for the Kansas Biological Survey and the Central Plains Center for BioAssessment. Whole stream respiration as well as net and gross production via the DO diel cycle method are also determined. Software has been built to support these calculations using large continuous data sets of several weeks to months.

Data Analysis and Interpretation

Data analysis tools and methods	<input checked="" type="checkbox"/>	summary tables, illustrative graphs
	<input type="checkbox"/>	parametric ANOVAs
	<input type="checkbox"/>	multivariate analysis
	<input checked="" type="checkbox"/>	biological metrics (<i>return single metrics</i>)
	<input type="checkbox"/>	disturbance gradients
	<input checked="" type="checkbox"/>	other: regressions, correlations, trends, and other statistical applications
Multimetric thresholds		
transforming metrics into unitless scores		cumulative distribution function
defining impairment in a multimetric index		Kansas returns single metrics but is exploring various indices.
Evaluation of performance characteristics <i>Refer to Quality Management Plan for SOPs and further information.</i>	<input checked="" type="checkbox"/>	repeat sampling
	<input checked="" type="checkbox"/>	precision
	<input checked="" type="checkbox"/>	sensitivity
	<input checked="" type="checkbox"/>	bias
	<input checked="" type="checkbox"/>	accuracy
Biological data		
Storage		Lotus Notes, Excel
Retrieval and analysis		Minitab, spreadsheet graphics, ArcView, ArcGIS, GARP (pending)